

Accelerated Site Technology Deployment

Technology Fact Sheet

Deploying Diamond Wire Saw Demolition and Size Reduction of a Reactor Bioshield

Columbus Environmental Management Project
In Partnership with the Office of Science & Technology

Introduction

The DOE Office of Science and Technology (EM-50) has partnered with the Columbus Environmental Management Project (CEMP) in an Accelerated Site Technology Deployment (ASTD) project to purchase and deploy a diamond wire saw technology at Battelle's West Jefferson Site. EM-50 is providing \$390K of funding for deployment of the diamond wire saw. Similar facilities at the West Valley Demonstration Project, the Mound Site, Hanford, the Savannah River Site, and Rocky Flats could benefit from the application of the diamond wire saw technology.

The diamond wire saw will be used to size reduce an activated bioshield and associated structures of a decommissioned research reactor at Battelle's West Jefferson Site. The technology has already been successfully used in the nuclear power industry at the Fort St. Vrain and Shoreham Nuclear Power Stations. The technology has also been demonstrated at both Argonne National Laboratory's Experimental Boiling Water Reactor facility and the Tokamak Fusion Test Reactor at the Princeton Plasma Physics Laboratory.

Technical Need

Like many DOE remediation projects, the CEMP has a need for a technology which can be used to rapidly demolish large concrete structures (e.g., shield walls, heavy equipment pedestals) where workspace is physically constrained. At Battelle's King Avenue site, demolition of large reinforced concrete machine pedestals set in pits below building grade was accomplished with a large jackhammer head mounted on a backhoe unit. A very large tent structure was required to control airborne dust and radioactive contamination. Progress with the jackhammer was slow because of the extensive reinforcing bar, which inhibited development of large fractures, and hindered removal of rubble. The bioshield for the JN-3

reactor (see Figure 1) is significantly larger than any of the concrete structures addressed to date. The bioshield and associated structures have massive reinforcement, and the bioshield/reactor pool liner also has 2" to 3" thick steel in connection with a bridge crane. The bioshield structure rises three stories from the building basement level but the building floors have insufficient strength to support heavy demolition equipment.



Figure 1. Interior JN-3 Reactor Building

System Description

The diamond wire (see Figure 2) incorporates beads of diamond impregnated material spaced along a continuous loop of wire "rope". There are approximately 40 beads per meter. The wire is usually passed through small diameter starter holes, which have been drilled through the structure to be cut. By controlling the orientation of the holes and the wire loop, the operator can very carefully control the size of the pieces being cut. Wire tension is maintained by spring mounted pulleys on the motor unit. Aside from the initial setup, wire saw cutting is controlled from a distance, reducing worker exposure.





Figure 2. Diamond Wire Saw in operation

The diamond wire saw rapidly cuts through materials such as concrete, re-bar and steel plate, generating very little dust from the material cut. The water coolant used with the diamond wire saw aids in control of any loose contamination. The water is collected in a sump, filtered and reused. The only materials that come in contact with the radioactive structure are the diamond wire itself and the water coolant.

Benefits

Diamond wire saws are very effective for cutting highly reinforced radioactive concrete structures, such as shielding and containment structures, especially where layers of differential hardness are present (e.g., steel lining of concrete surfaces and steel reinforcing bars). With only the diamond wire in direct contact with the radioactive material, and being able to cut dissimilar materials with one operation "remotely", this technology provides more efficient material disposal, more effective

contamination control, and less personnel exposure than conventional methods presently being used. Deployment of the diamond wire saw is expected to result in cost savings of approximately \$271K. This proposed deployment will help establish "implementation costs" for this technology in radiological applications elsewhere within the CEMP and at other sites.

Status

Battelle's path to closure requires the removal of the JN-3 bioshield and associated structures in the FY 00/01 time frame. This deployment has been incorporated in Battelle's work plan for FY 2000. Actual operation of the diamond wire saw will be under a competitively procured, fixed-price subcontract. The successful bidder will have demonstrated experience in demolition of large reinforced concrete structures and, preferably, experience working in a radiological environment. The statement of work, contract generation, award of bid and field deployment are scheduled for FY00 with completion in FY01.

**For more information about deployment of the Diamond Wire Saw at the
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